Getting Started

(http://docs.oracle.com/javase/tutorial/getStarted/index.html)

Objectives

- About the Java Technology
- What can Java Technology do?
- How can Java support platform-independence?
- Java Platform
- Set up Environment Variables
- The first Java program in the NetBeans
- Structure of a Java program.
- End users run Java Programs

About the Java Technology(1)

- ***History***
  - 1990, James Gosling, Bill Joy, Patrick Naughton(Sun Microsystem) developed the Oak language for embedding programs to devices such as VCR, PDA (personal data assistant). The Oak programs require:

    - Platform independent/- Extremely reliable/ - Compact
  - 1993, interactive TV and PDA failed, Internet and Web were introduced, **Sun** change the Oak to an internet-development environment with a new project, named **Java**.
  - 1994, the Sun's *HotJava Browser was introduced* (written using Java). It showed the strength of Java applets and abilities to develop Java application.

About the Java Technology(2)

History…

- **Embedded Systems (1991 – 1994)**
- **A client – side Wonder (1995 – 1997)**
- **Moved into the Middle – tier (1997 – to present)**
- **Future: may gain more success**

About the Java Technology(3)

The Java Programming Language is a high-level language. It's **characteristics**:

- Simple
- Object oriented
- Distributed
- Multithreaded
- Dynamic linking
- Architecture neutral
- Portable
- High performance
- Robust
- Secure

What can Java Technology do?

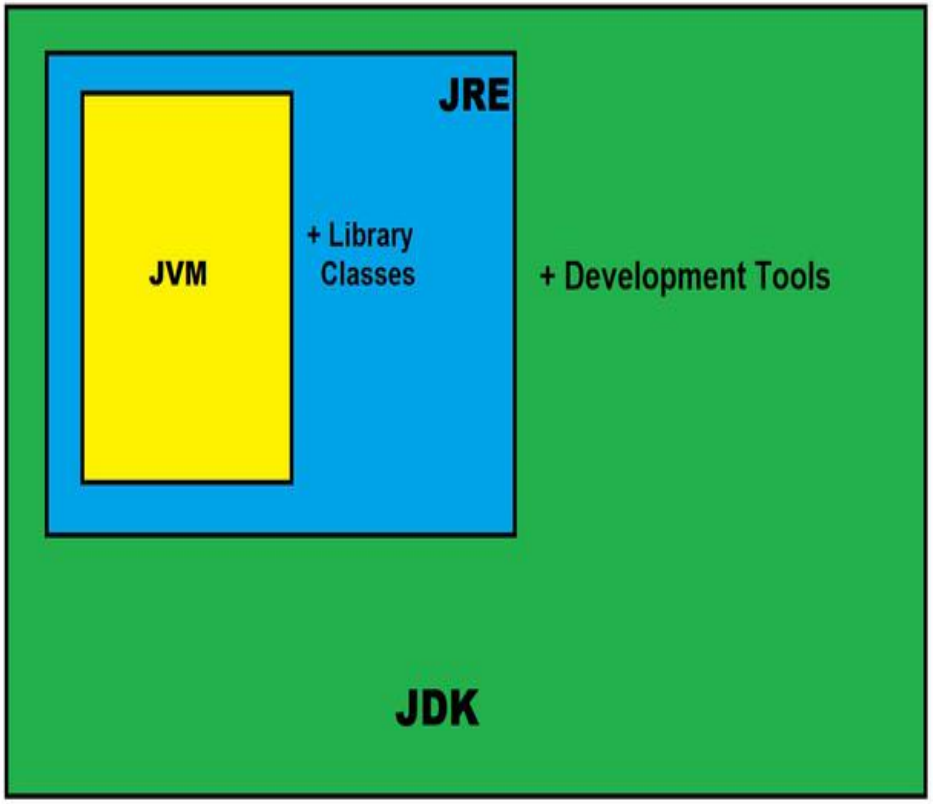
Using Java, we can:

- Development Tools.
- Application Programming Interface (API).
- Deployment Technologies.
- User Interface Toolkits.
- Integration Libraries.

➔Desktop Application (Console App, GUI Apps)
➔Web-based Applications
➔ Network-based Applications
➔ Game
➔ Distributed Applications
➔ Embedding Application (Apps on Devices)

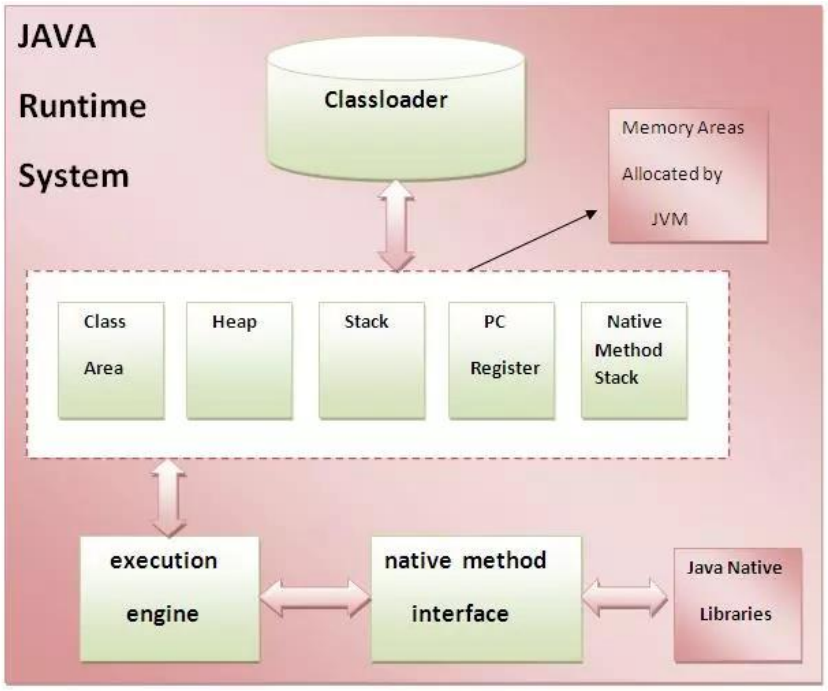
JDK: Java Development Kit

- The Java Development Kit (JDK) is a software development environment which is used to develop java applications and applets. It physically exists. It contains JRE + development tools.



Java Virtual Machine

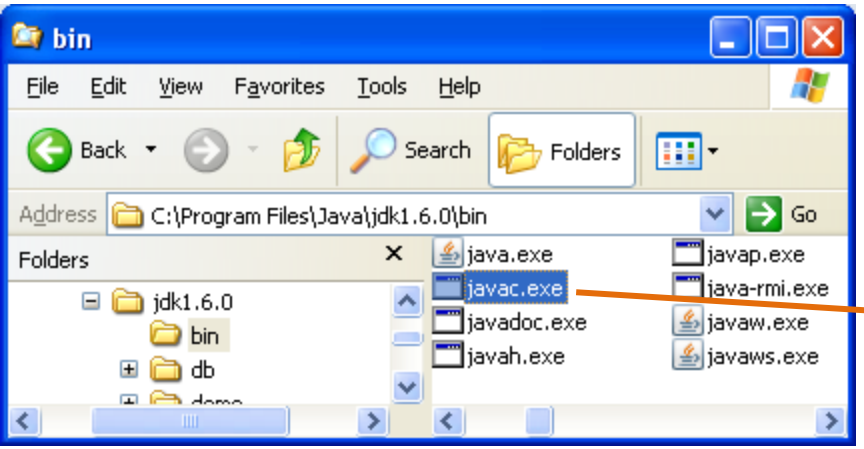
- The Java Virtual Machine is an abstract computing machine. Like a real computing machine, it has an instruction set and manipulates various memory areas at run time. It is reasonably common to implement a programming language using a virtual machine; the best-known virtual machine may be the P-Code machine of UCSD Pascal.

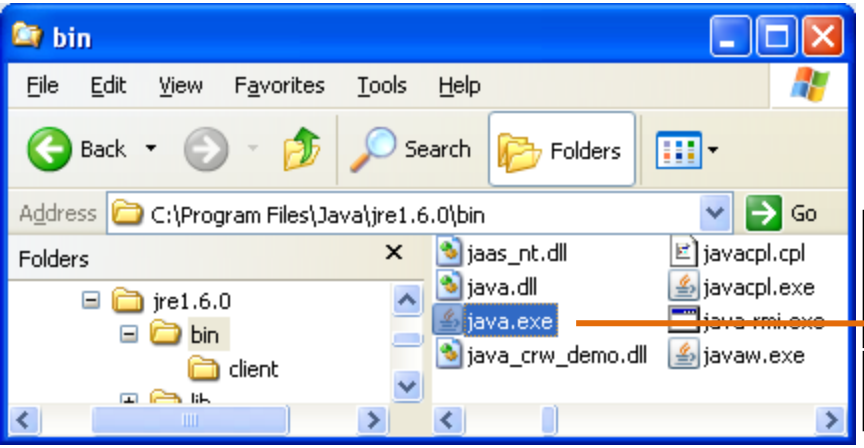


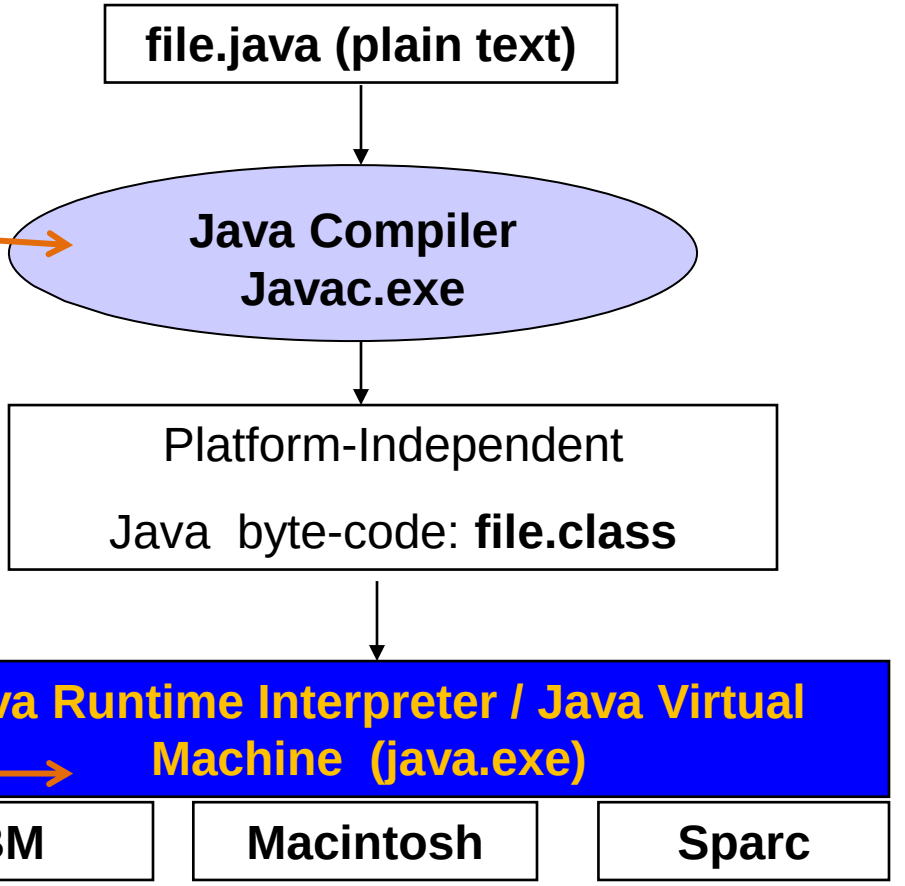
http://en.wikipedia.org/wiki/Java_virtual_machine

More details:
https://docs.oracle.com/javase/specs/jvms/se8/html/jvms-1.html#jvms-1.1

How can Java support platform-independence?

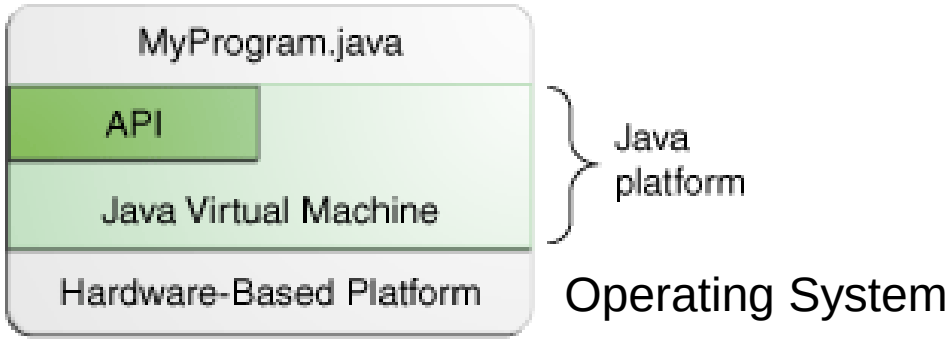






Java Platform

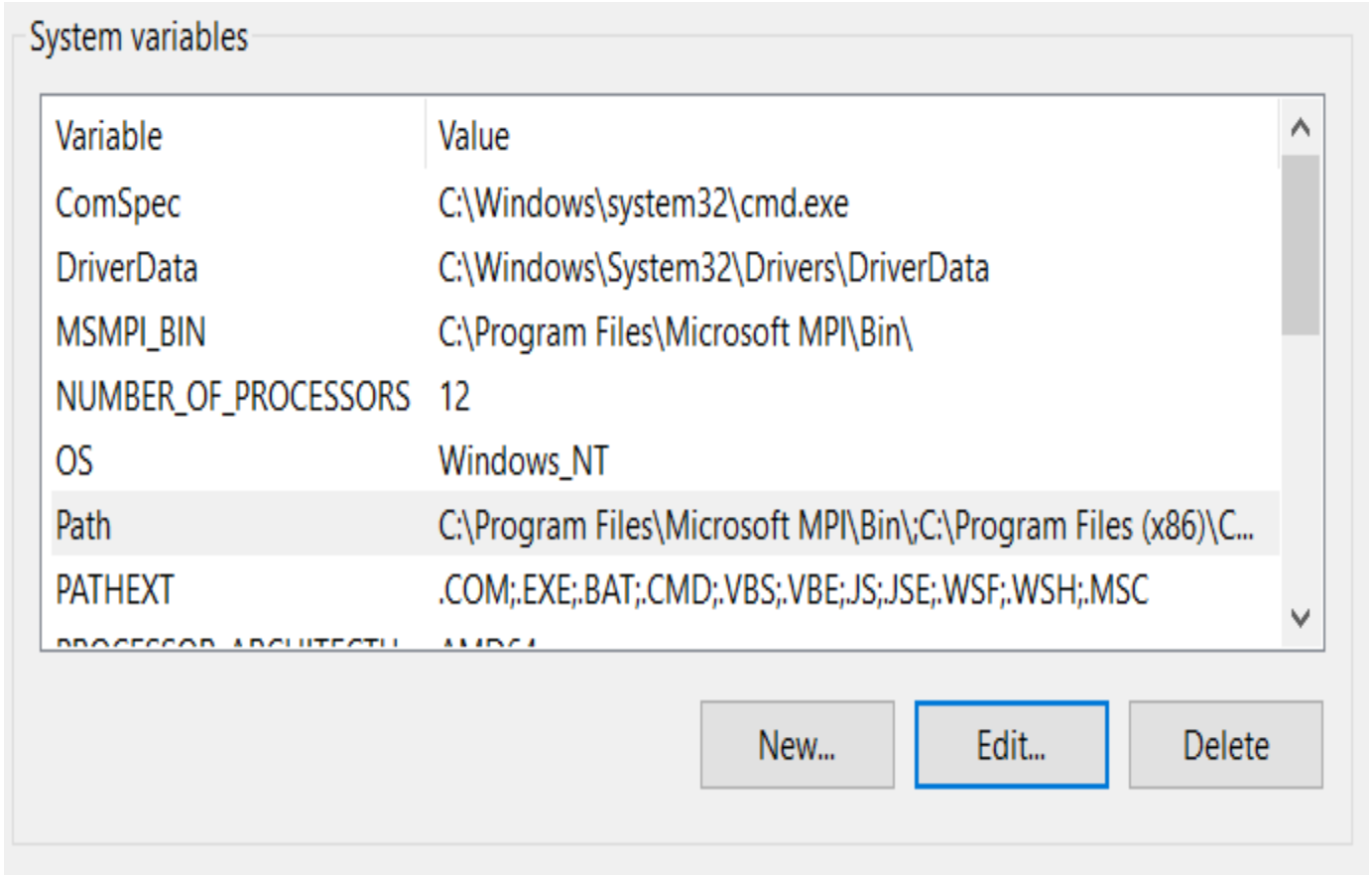
- A platform is the hardware or software environment in which a program runs.
- The Java platform has two components:
  - The Java Virtual Machine
  - The Java **A**pplication **P**rogramming **I**nterface (API)



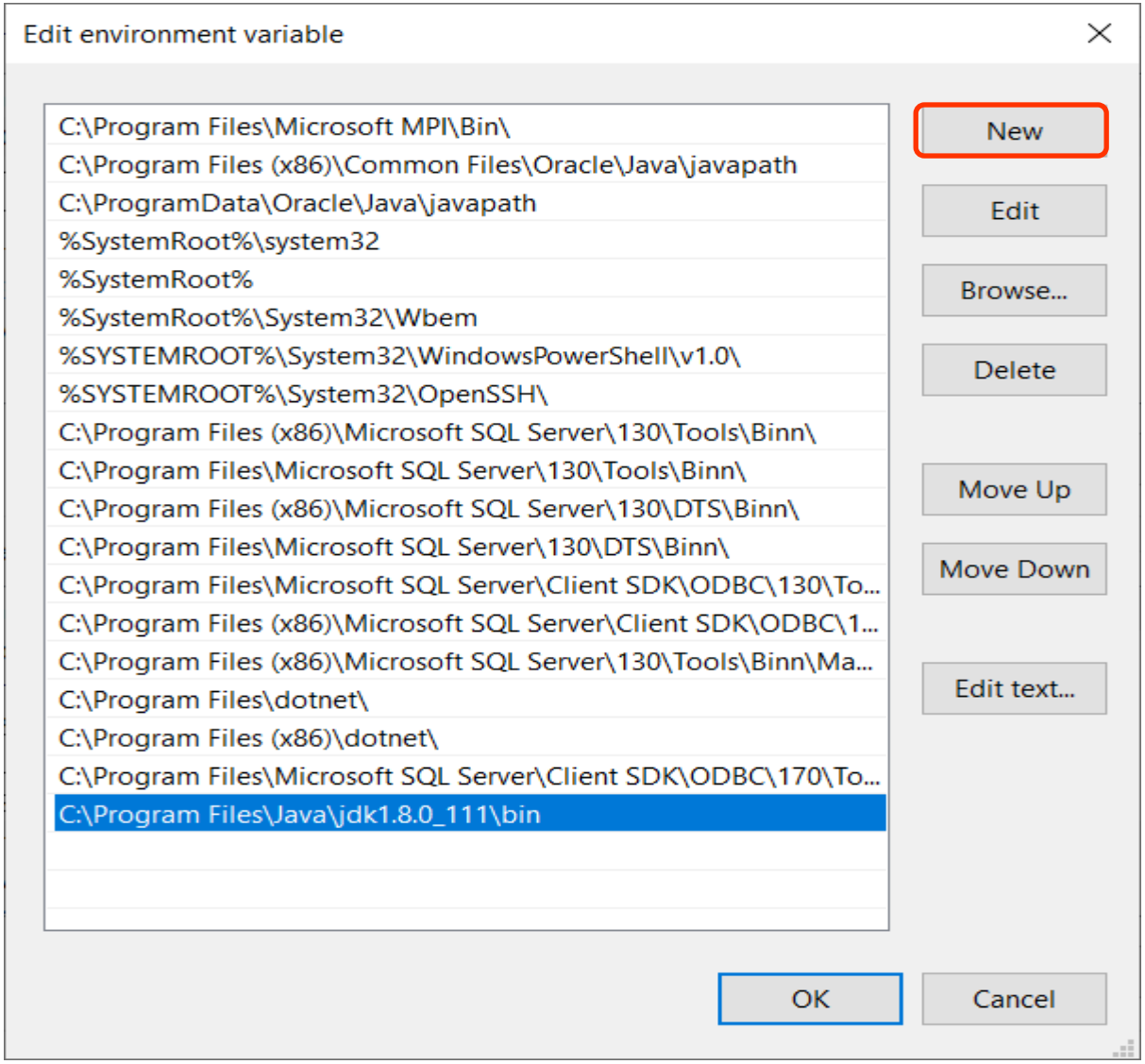
Set up Environment Variables

- After installing JavaSE (Java Development Kit Standard Edition), environment variables should be setup to point to the folder in which JavaSE is installed.
- Steps: My Computer/ Properties/ Advanced/Environment Variables/System Variables/ Path/ Edit

Set up Environment Variables



Set up Environment Variables



The first Java program in the NetBeans

This program will show the string “Hello World” to the screen.

Steps

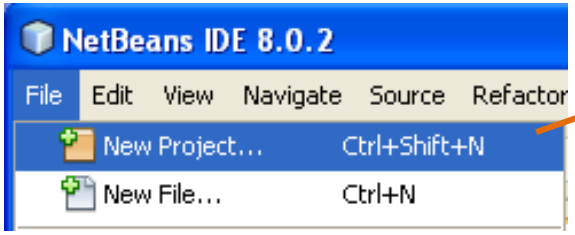
1- Create a new Java NetBeans project

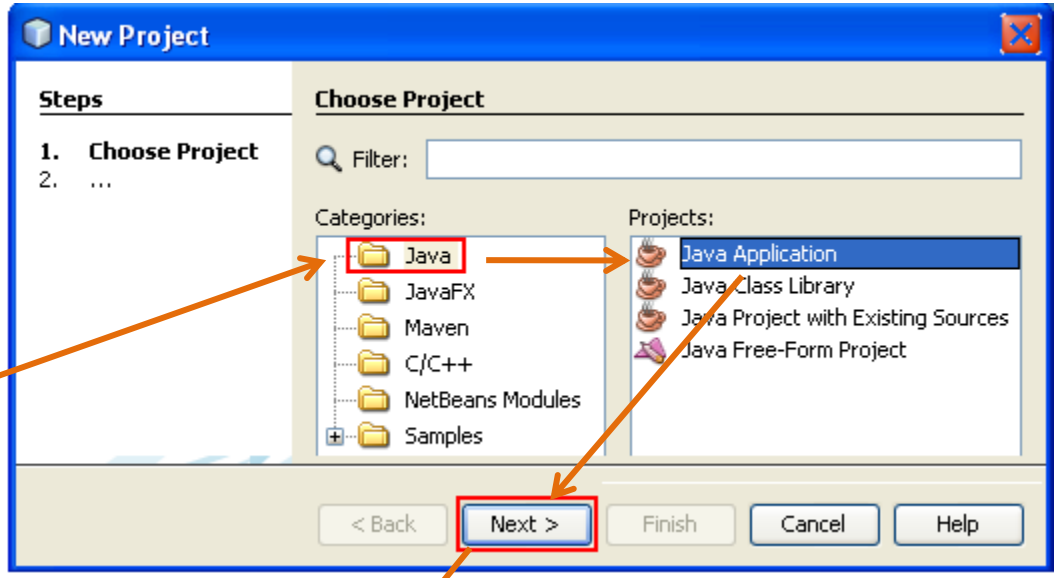
2- Add a Java class

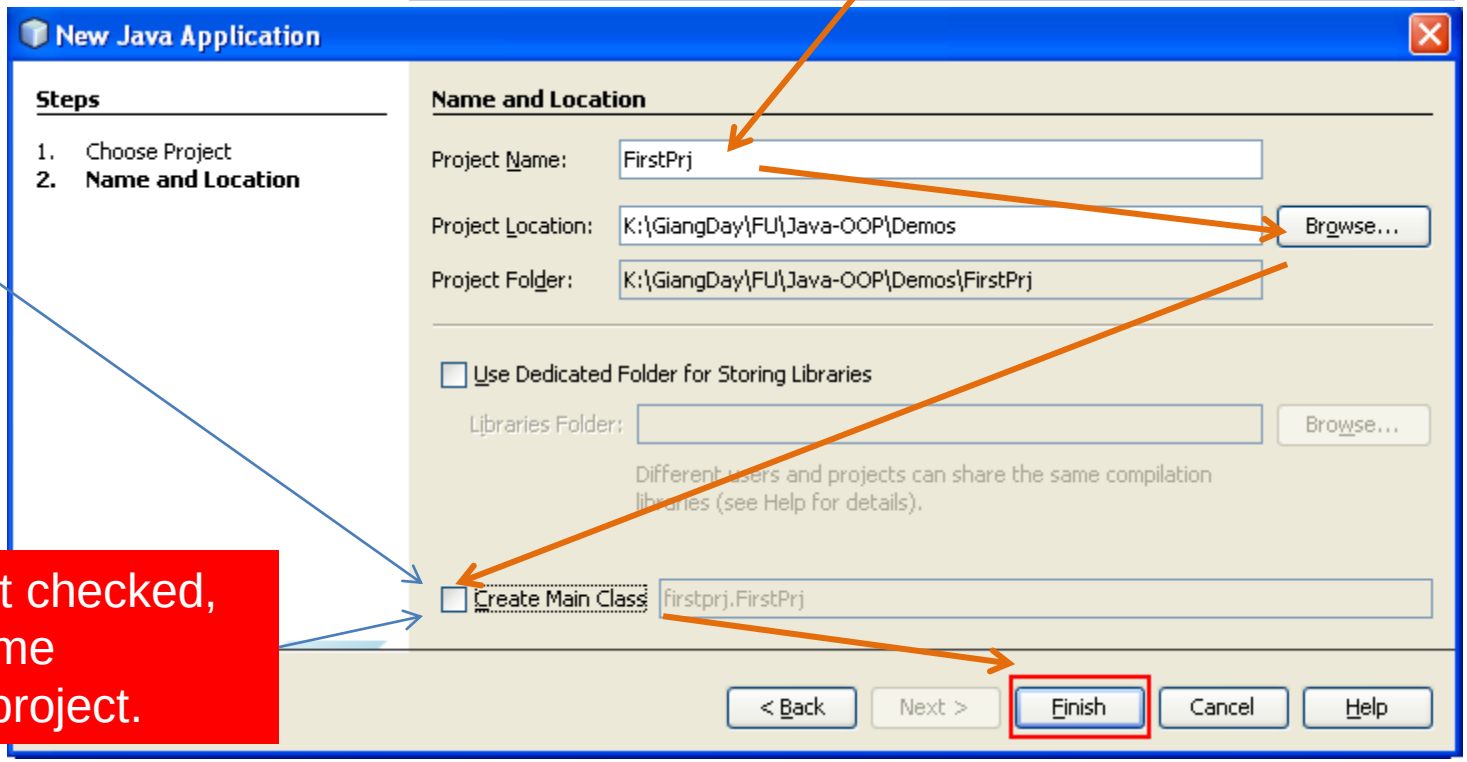
3- Write code

4- Compile/Run the program

Step 1- New Project



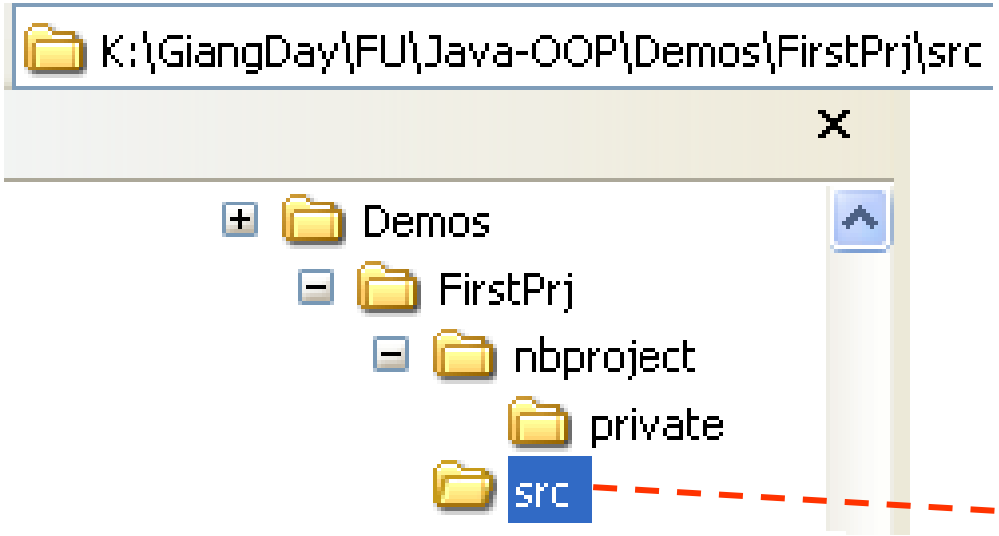




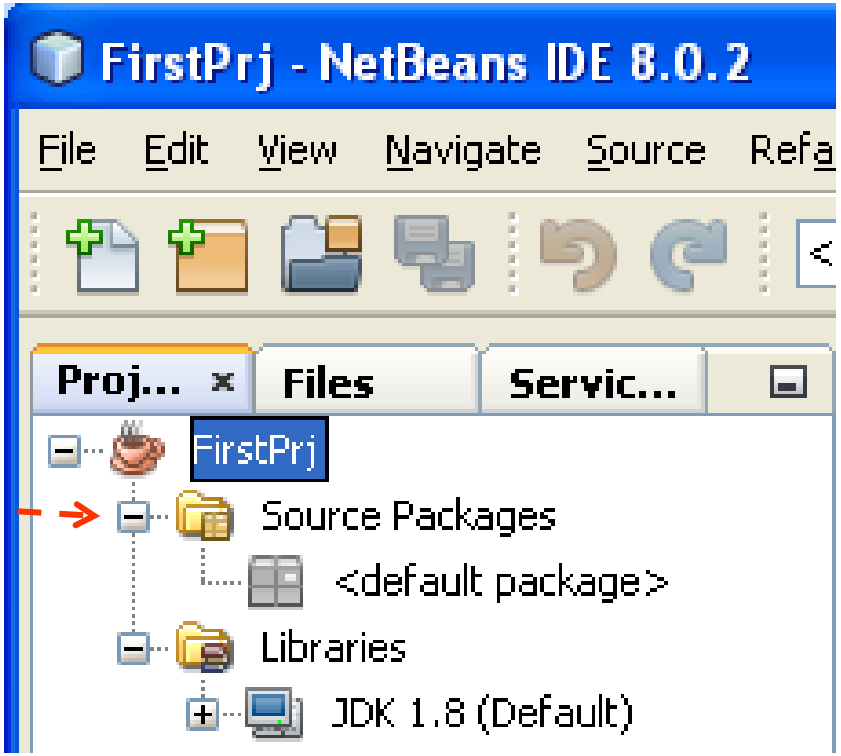
If this option is checked, NetBeans will automatically generate a class, named Main, for the project.

If this option is not checked, we can create some programs in one project.

New Project…: Initial Project Structure

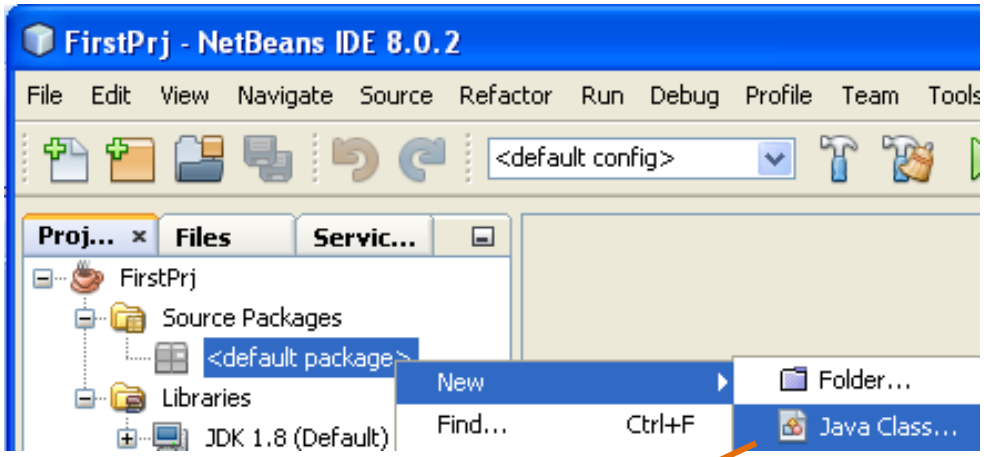


In Windows Explorer

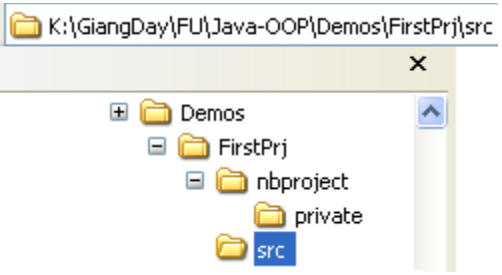


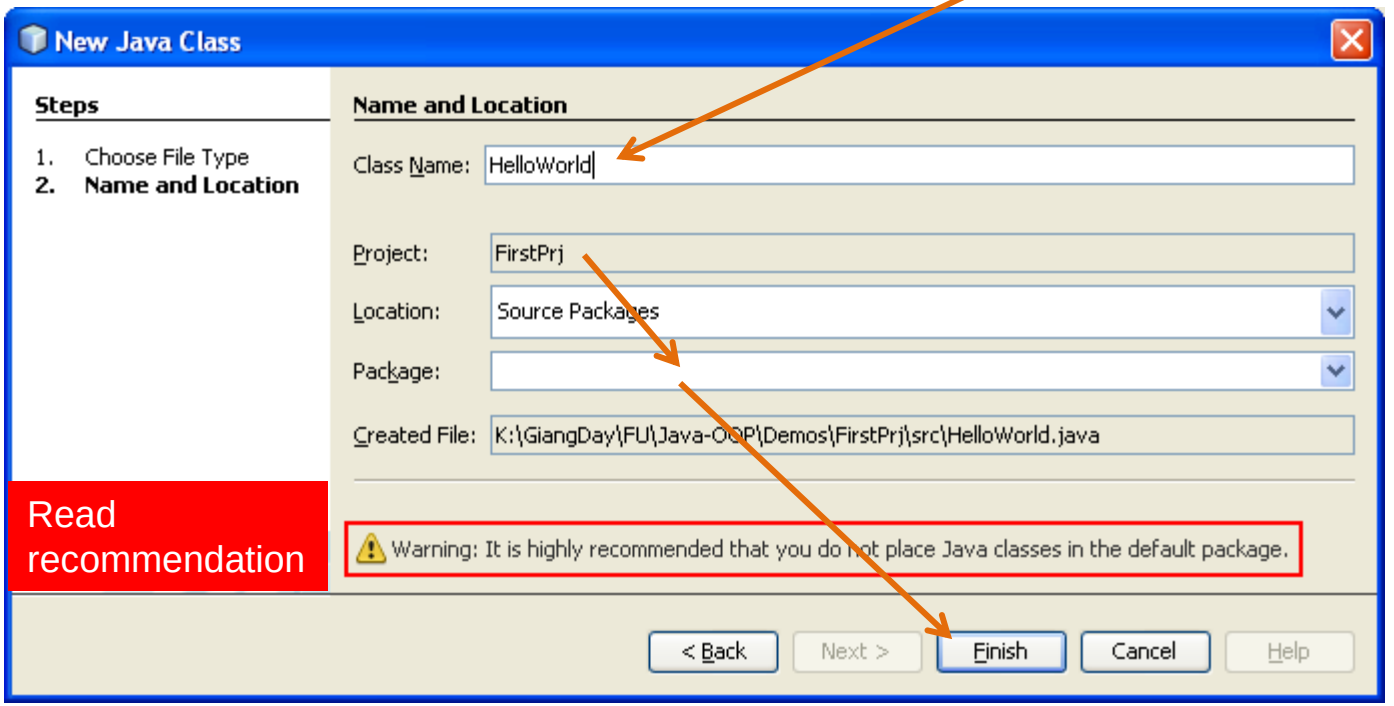
In NetBeans

Step 2: Add a Java Class



Package: Subdirectory of the folder Project/**SRC**

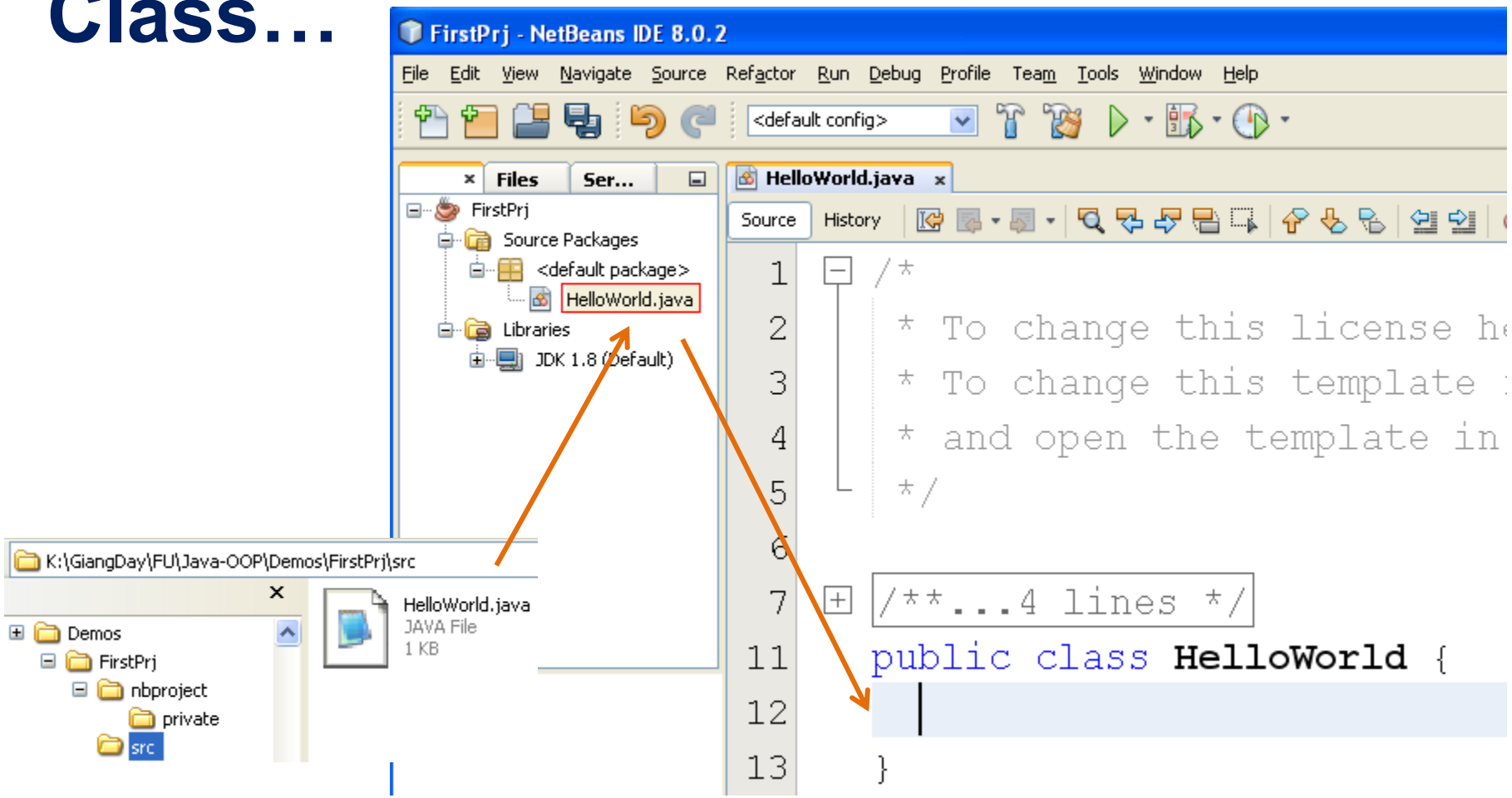




Read recommendation

In this demo, we do not specify package intentionally

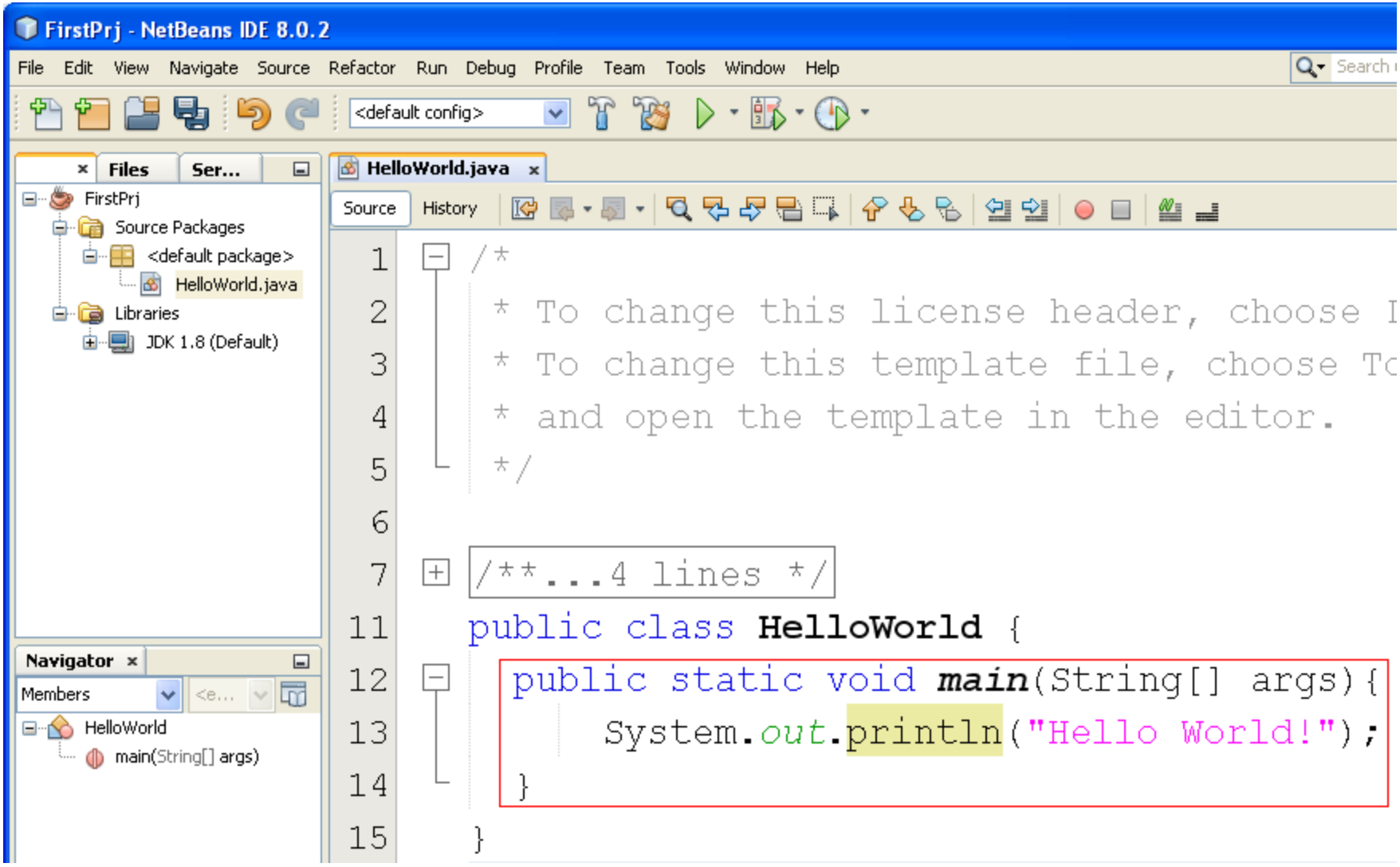
Add a Java Class…



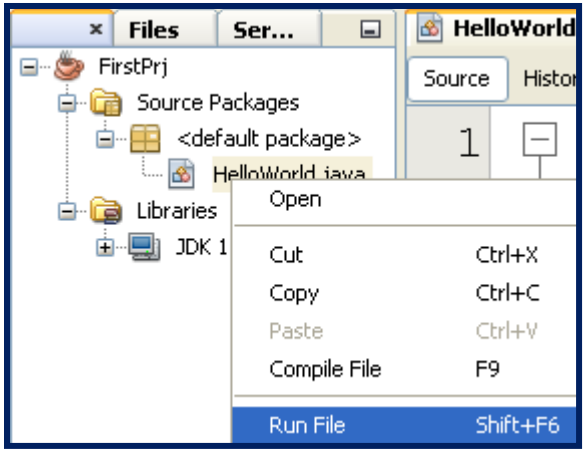
In Windows Explorer

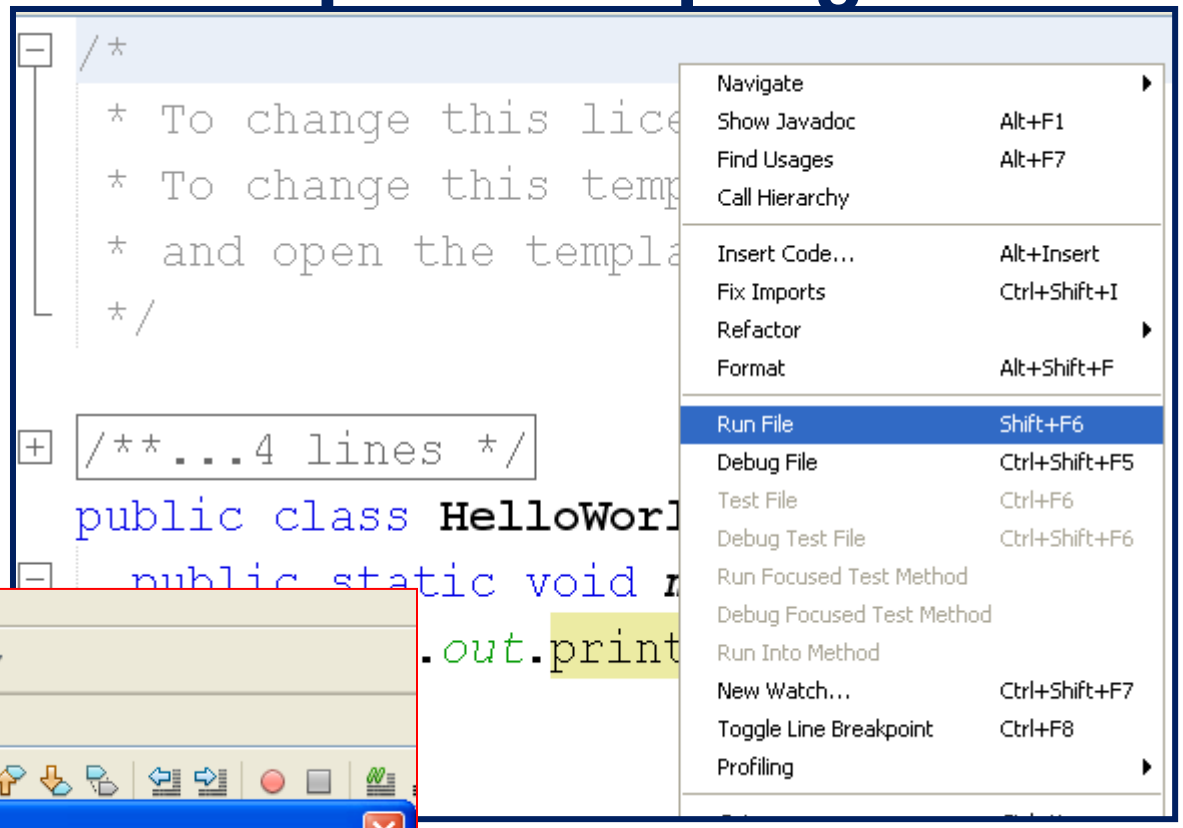
In NetBeans

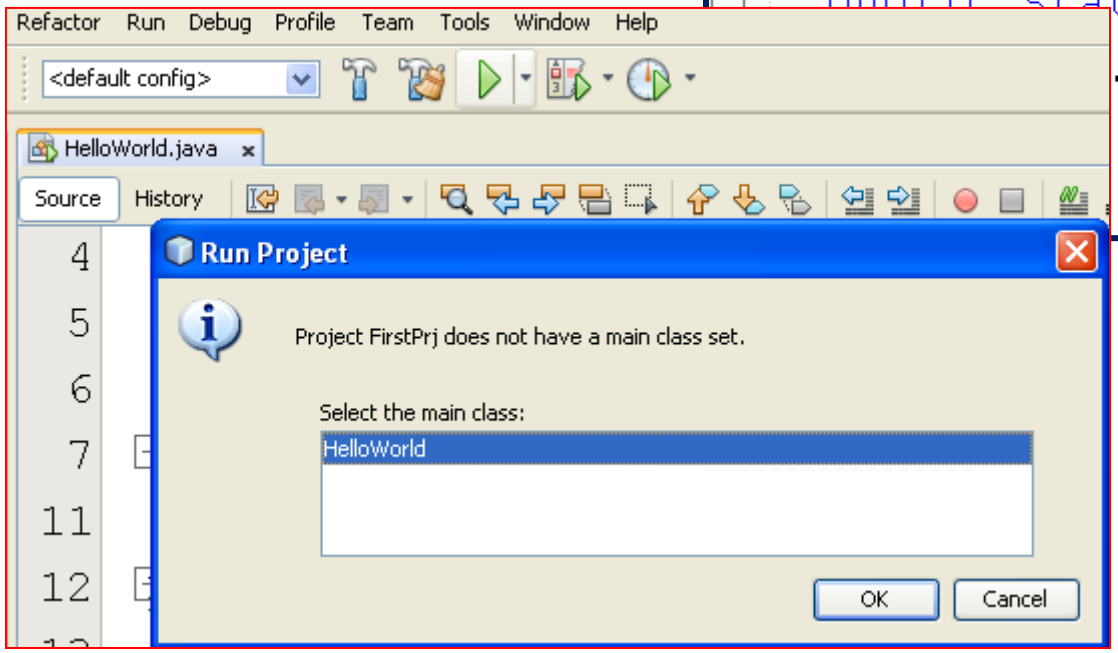
Step 3: Write code

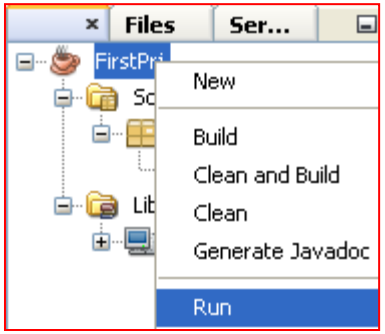


Step 4: 4 ways to Compile/Run program in NetBeans

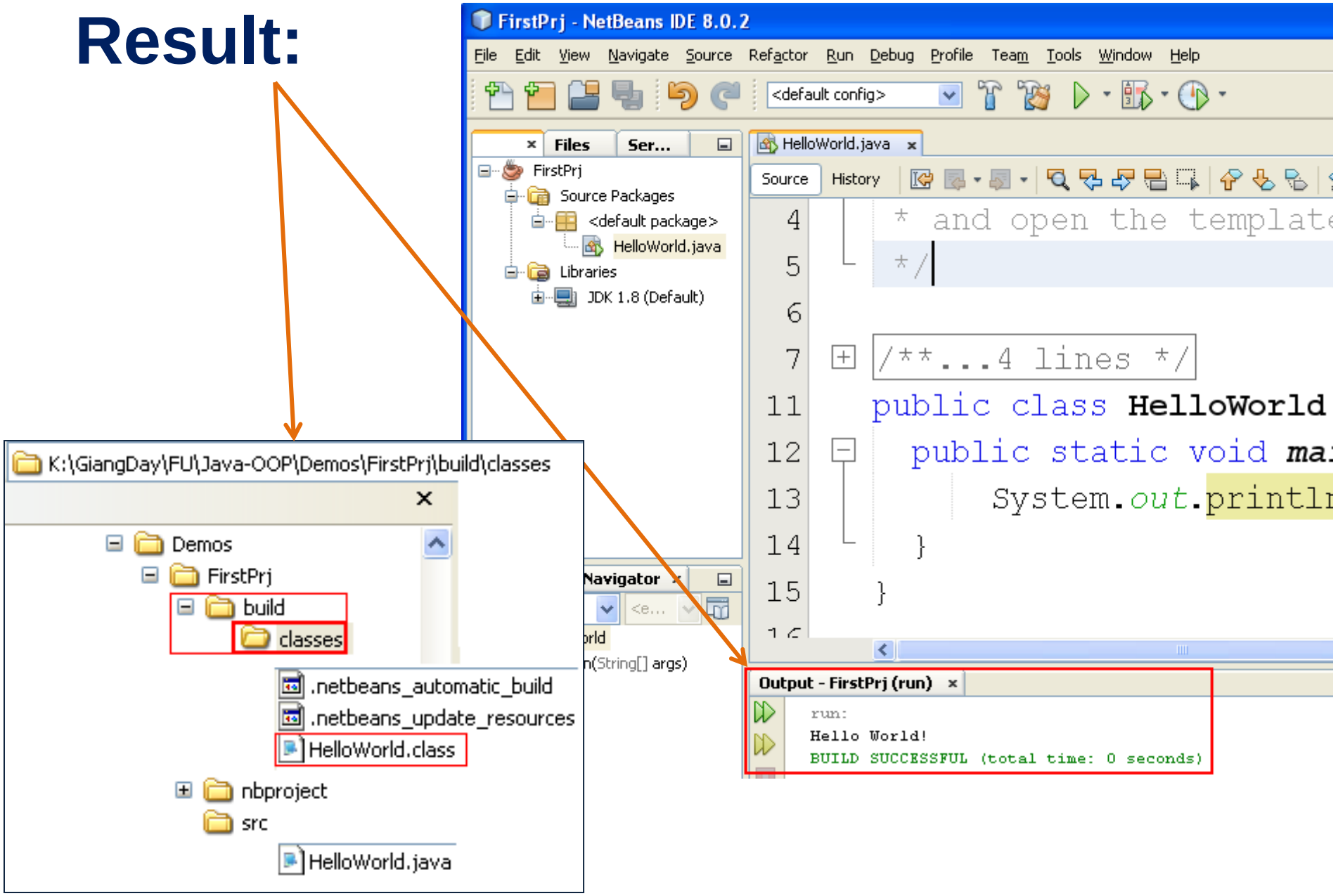






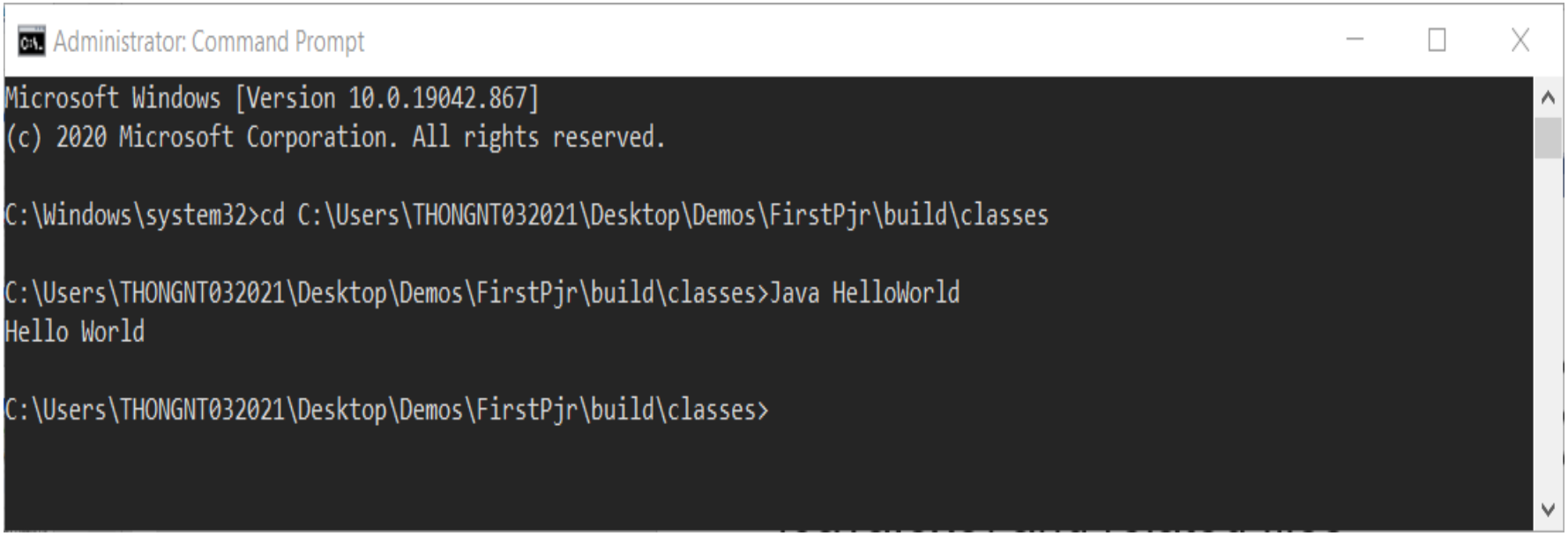


Result:


FirstPrj - NetBeans IDE 8.0.2
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
<default config>
Files Ser...
FirstPrj
Source Packages
<default package>
HelloWorld.java
Libraries
JDK 1.8 (Default)
HelloWorld.java
Source History
4 * and open the template
5 */
6
7 /**...4 lines */
11 public class HelloWorld
12 public static void ma
13 System.out.println
14 }
15 }
Navigator
Output - FirstPrj (run)
run:
Hello World!
BUILD SUCCESSFUL (total time: 0 seconds)
K:\GiangDay\FU\Java-OOP\Demos\FirstPrj\build\classes
Demos
FirstPrj
build
classes
.netbeans_automatic_build
.netbeans_update_resources
HelloWorld.class
nbproject
src
HelloWorld.java

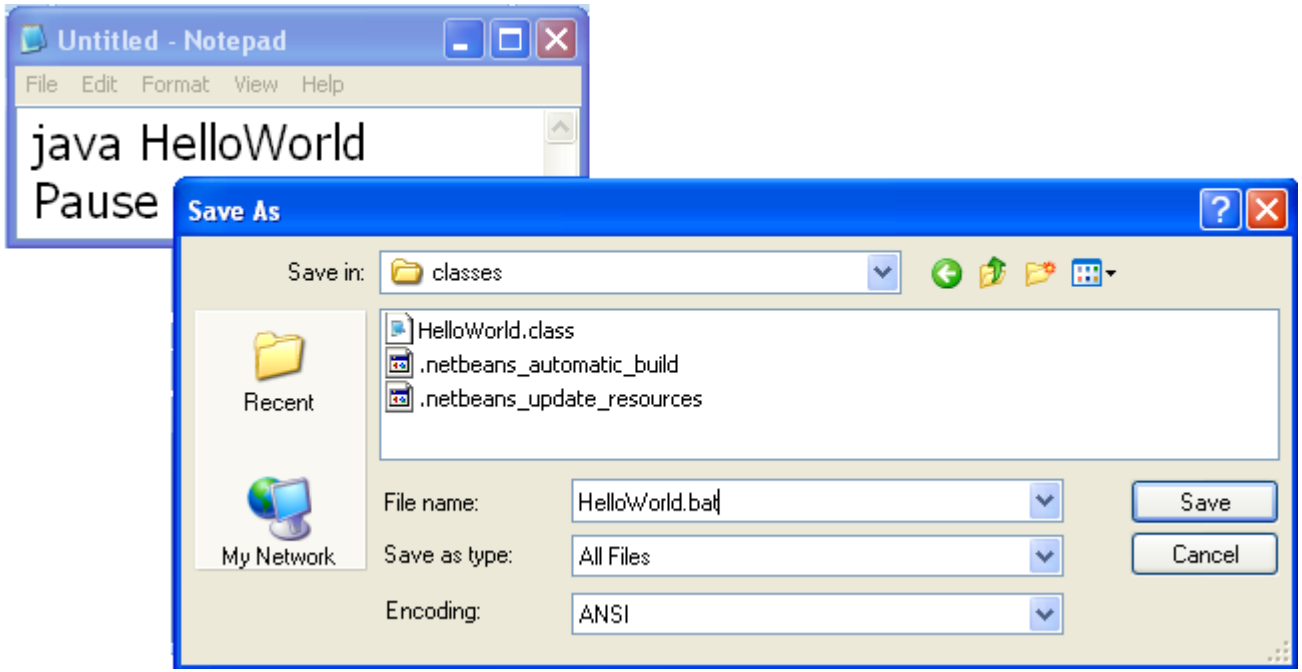
End users run Java Programs

- Users can not run Java programs in NetBeans but in Java Runtime Environment (jre) installed (Java.exe) and related files
- Syntax for running a Java program:



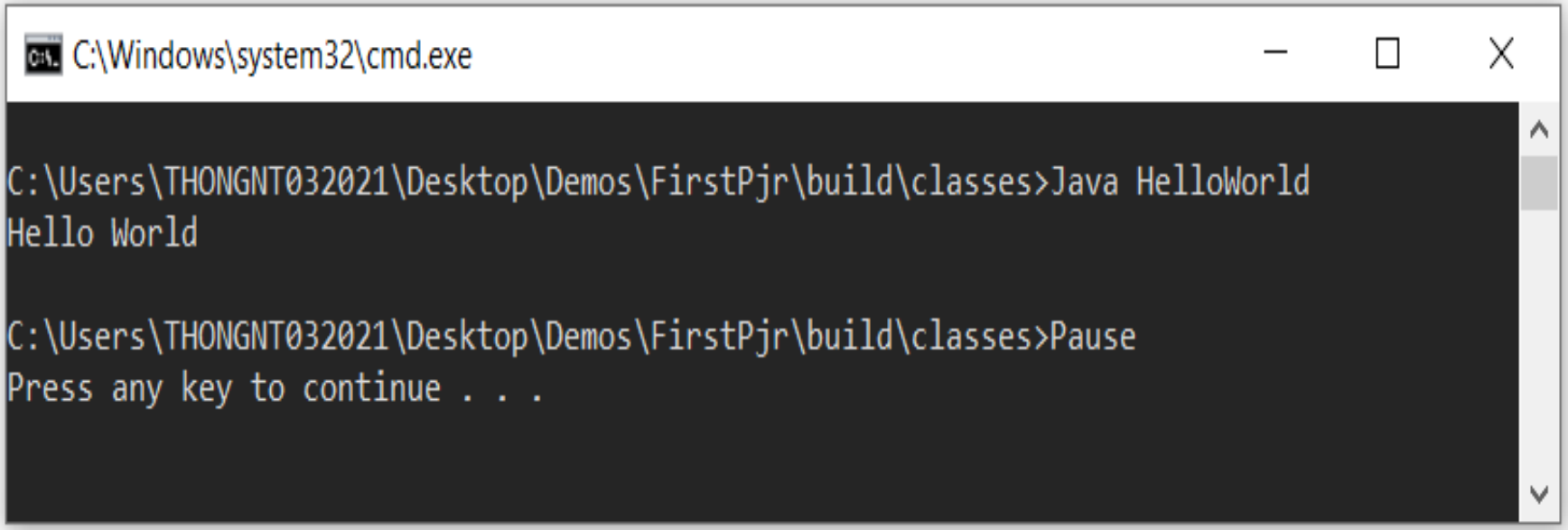
End users run Java Programs…

- Developer should support end users an easier way to run the program: **a BAT file**



End users run Java Programs…

.netbeans_automatic_build	19/04/2021 7:45 AM	NETBEANS_AUTO...	0 KB
.netbeans_update_resources	19/04/2021 7:45 AM	NETBEANS_UPDA...	0 KB
Helloworld	19/04/2021 7:48 AM	Windows Batch File	1 KB
HelloWorld.class	19/04/2021 7:45 AM	CLASS File	1 KB



Explain JDK and its tools

- javac (Java compiler)

```
javac [option] source
```

where,

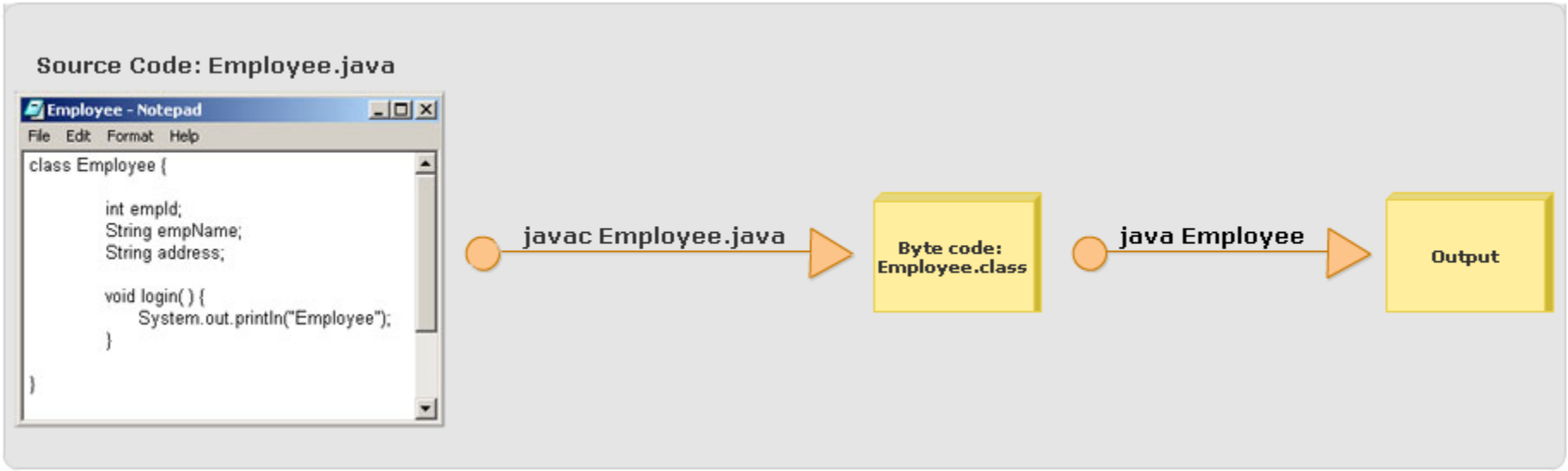
`source` is one or more file names that end with the extension .java.

- java (Java interpreter)

```
java [option] classname [arguments]
```

where,

`classname` is the name of the class file.



A Closer Look at the "Hello World!" Application

- ***Comments***
  - Traditional **/*this is a comment*/**
  - Comment to line end **//this is an end of line comment**
- ***Class declaration***
  - **public class ClassName { ... }**
  - For example: public class HelloWord { ... }
- ***The main Method – Entry point of Java program***
  - **public static void main(String[] args) {..}**
  - public and static can be written in either order
  - **The main method accepts a single argument: an array of elements of type String. A demonstration for passing strings to the main method will be presented in the next session.**

Common Problems (and Their Solutions)

- **Compiler Problems**

  'javac' is not recognized as an internal or external command, operable program or batch file

  ->Updating the PATH variable in the JDK

  - Syntax Errors (All Platforms)
  - Semantic Errors

- **Runtime Problems**
  - Exception in thread "main" java.lang.NoClassDefFoundError
  - Could not find or load main class HelloWorld.class

Classname is incorrect

Try and Explore

Change	To – If no error, try run it
public class HelloWorld	public class HelloWorld2
public class HelloWorld	class HelloWorld2
public static void main(String[] args)	public static void main(String args[])
public static void main(String[] args)	public void main(String[] args)
public static void main(String[] args)	void main(String[] args)

Summary

- An overview of Java technology as a whole.
- What to download, what to install, and what to type, for creating a simple "Hello World!" application.
- Discusses the "Hello World!" application.
- Trouble compiling or running the programs.